

Draft Environmental Assessment
TEN MILE CREEK WATER PRESERVE AREA
CRITICAL PROJECT
ST. LUCIE COUNTY, FLORIDA

Review Draft

Provide Comments To:

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ENVIRONMENTAL ASSESSMENT

ON

The 10 MILE CREEK

CRITICAL PROJECT

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ENVIRONMENTAL ASSESSMENT

ON

The 10 MILE CREEK

CRITICAL PROJECT

1. PROJECT PURPOSE AND NEED

1.1 PROJECT AUTHORITY.

The proposed Ten Mile Creek Water Preserve Area Critical Project was authorized under section 528 of the Water Resources Development Act of 1996, by Public Law 103-404.

1.2 PROJECT LOCATION.

The proposed Ten Mile Creek Water Preserve Area (WPA) is situated just south of Ten Mile Creek and southwest of Ft. Pierce in St. Lucie County, Florida. The planned WPA will be located immediately west of the crossing of Florida's Turnpike and Interstate-95, south of Highway 70 (Okeechobee Road) and north of Midway Road ([see figure 1, vicinity map](#)). The low level salinity control structure for Ten Mile Creek is less than one-half mile east of the proposed WPA site.

Plan View

1.3 PROJECT NEED OR OPPORTUNITY.

There is a need to regulate the delivery of freshwater to the St. Lucie River and in turn to the Indian River Lagoon (IRL). This need was clearly established by the Indian River Lagoon Surface Water Management and Improvement Plan (SFWMD IRL SWIM plan, 1994). This plan identified excess freshwater as a major pollutant to the St. Lucie Estuary (SLE) and the IRL. Freshwater is considered a pollutant when it is delivered all at once by canals (that is, when too great a volume is delivered over a short time period, causing salinity in the estuary to drop below optimal levels for desired plant and animal communities). Conversely, lack of flow is also detrimental to the estuary. Inflows to the SLE such as Ten Mile Creek, C-23, C-24, C-25, and C-44 efficiently drain the land while increasing the drainage area as compared to the historic natural system.

This altered freshwater delivery changes salinity concentration of the estuary, resulting in changes unfavorable to seagrass and benthic organisms which are at the base of the food chain, and potentially affects many other organisms dependent on the estuary for part of their life history requirements.

Implementation of the recommendations of the plan is a primary responsibility of the Indian River Lagoon Feasibility Study. The goal of the feasibility study is to develop plans to restore desirable salinity concentration in the estuaries. Construction of surface water detention systems, including reservoirs or Water Preserve Areas (WPA), is a probable means of reaching that water quality goal. One of the potential WPA sites is the 10 Mile Creek site. This site was selected as a critical project for the Central and South Florida Restudy. The 10 Mile Creek WPA would help to attenuate high volume 10 Mile Creek basin runoff into the SLE.

There is also a need to improve water quality in the Ten Mile Creek basin. Most of the upstream basin is in agricultural land use. Run-off from agricultural land tends to have a higher load of suspended solids and nutrients than native land cover. Capturing and detaining this run-off will allow most of the solids to settle out of suspension and remove a portion of the nutrient load. Vegetation in the reservoir and in the downstream polishing cell will also consume nutrients (Kadlec and Knight 1996, Fall and Hendrickson 1988). Precise nutrient concentration goals for the estuary have not been set, but it is clear that detention facilities will have a positive impact on water quality as well as the quantity and timing of freshwater delivered to the estuary.

1.5 DESCRIPTION OF THE PROPOSED ACTION.

Storm water storage is essential to this action. The proposed action is to construct a two- stage detention system consisting of a WPA and polishing cell. A series of large pumps would be used to deliver waters from Ten Mile Creek into the WPA during high water (at a rate of?) 380 cfs. Water would be stored in the 554 acre WPA, and then metered out through structures into a polishing cell which is smaller in size (134 acres) and shallower (<4ft) in depth. The deep water storage cell would be kept up to ten feet deep, allowing storage of approximately 5,000 acre-feet of water. Soil areas (best for levee building) will be excavated by heavy equipment and used for levee construction. The height of the levee around the deep WPA will be 12 to 15 feet above surrounding

natural ground, whereas the polishing cell levee height would be much less (6.5 feet above grade) (See Figure 2, plan view). A 650 ft. overflow weir, consisting of capped sheet pile and riprap, will be located within the exterior levee downstream of the pumping station. Water would be delivered from the WPA to the polishing cell through a spillway (500cfs capacity). After the water has passed through the polishing area, box culverts will feed an outlet channel back to Ten Mile Creek.

Flows of cleaner water will be delivered back to Ten Mile Creek downstream of the Gordy Road structure, to achieve a more favorable and natural hydrologic regime. Sediment loads will be reduced in these deliveries to the SLE. The WPA and polishing cell would act to further reduce nutrient loads in these deliveries. When available, stored water can also be released, based on rainfall, in the drier winter months when low or no flow periods often occur.

SFWMD optimization model results depict that the WPA will be near capacity 27% of the time. Approximately 30% of the Ten Mile creek basin runoff will be routed through the reservoir. Ninety percent of the water routed to the WPA will have a residence time of at least 50 days.

1.6 RELATED ENVIRONMENTAL DOCUMENTS.

The draft Programmatic Environmental Impact Statement (EIS) for the Central and Southern Florida Project Comprehensive Review Study (Restudy) report was prepared in 1998 and is planned to be finalized by July, 1999. The Indian River Lagoon (IRL) Feasibility Study is one of the first feasibility studies from the Restudy. The IRL project is determining a number of alternatives to restore the SLE to a more natural system. The Ten Mile Creek WPA is one of a number of WPA's planned for the Upper East Coast section of the Restudy to aid in the restoration of the SLE.

1.7 DECISION TO BE MADE.

This Environmental Assessment is the foundation of the National Environmental Policy Act public decision process. The U.S. Army Corps of Engineers and South Florida Water Management District must decide whether to cost share construction and operation of the Ten Mile Creek Water Preserve Area as a public interest project and forward this report to Washington for Congressional approval, authorization, and appropriations.

1.8 ISSUES.

The following issues were identified by the preparers of this Environmental Assessment as relevant to the proposed action and appropriate for detailed evaluation:

Water quality benefits from the WPA and polishing cell.

Minimization of wetlands impacts.

1.9 PERMITS, LICENSES, AND ENTITLEMENTS.

In the future, The US Army Corps of Engineers (Corps) will apply for a Water Quality Certification from the Florida Department of Environmental Protection to construct the project. Lands required for the construction and operation of the 10 Mile Creek WPA will have to be provided by the local sponsor (South Florida Water Management District).

2. ALTERNATIVES Considered

2.1 No Action.

Under this alternative, no construction or corrective measures would be implemented and the St. Lucie Estuary would continue to degrade. Stormwater runoff from the 10 Mile Creek basin would continue to pollute the estuary. Historically, the SLE supported shoal grass and oyster communities and the regulatory releases and basin runoff has caused the demise of these organisms. This alternative is not acceptable if the goals of restoring the St Lucie Estuary are to be met.

2.2 Nonstructural Combination Plan

This plan combines rezoning with on-site detention/retention. This plan will provide some small benefits to the SLE, but not enough to return the estuary to its natural state

2.3 LTC Joint Venture WPA SITE

This potential WPA site offered storage to attenuate stormwater, but because of the distance from Ten Mile Creek, increased canal infrastructure and pumps would be needed. The storage potential for this site was approximately 5000 acre-feet.

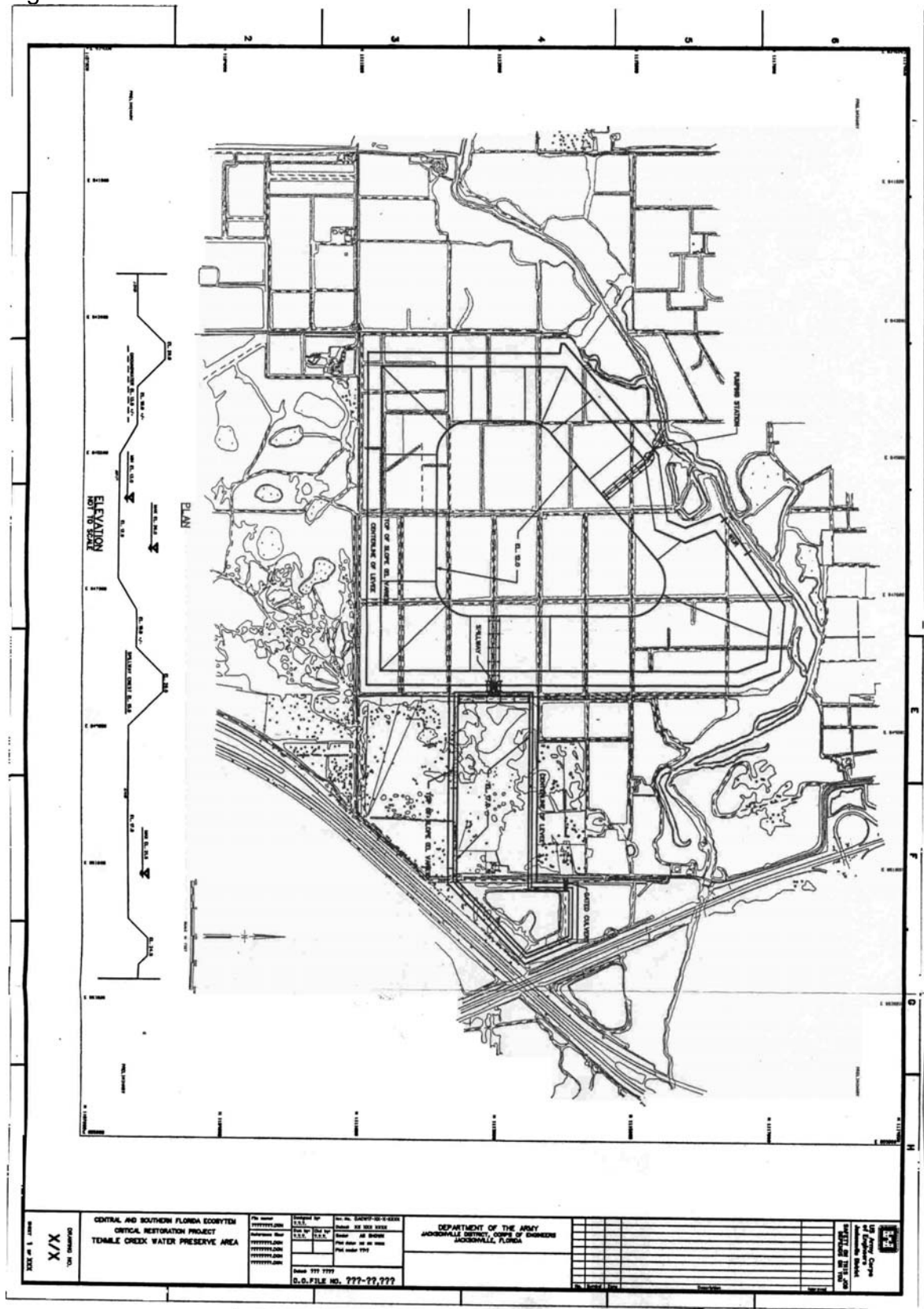
2.4

2.5 SELECTED PLANelected Plan (Ten Mile Creek WPA)

The selected plan is the Ten Mile Creek WPA and polishing cell. The storage reservoir berm will be 15-20 feet high and the side slopes are to be 1 vertical to 4 horizontal. Water depths will range from 0 to 10 feet and when filled have a total storage potential of 500 acre-feet. The WPA will be near capacity 27% of the time. The bottom of the WPA will be excavated to 1 foot into the groundwater. A 380 cfs pump system of pumps will supply water from Ten Mile Creek into the WPA. A 5000 cfs overflow weir, to prevent levee breach, will be located downstream of the pump station. A 500 cfs spillway will feed water into the polishing cell. The deep water storage will have a residence time of at least 50 days.

The polishing cell levees will be 6.5 ft. high with the same side slopes as the WPA. Box culverts will penetrate the polishing cell and feed an outlet to Ten Mile creek. The polishing cell water depth will optimize water quality benefits. The major difference between this plan and LTC WPA is the proximity to Ten Mile Creek. The selected plan is much closer to Ten Mile Creek and requires less infrastructure. The two plans had approximately the same amount of storage and levee design with Ten Mile Creek costing less.

Figure 2



3. AFFECTED ENVIRONMENT

St. Lucie County is located in the central part of Florida along the east coast. A coastal ridge is present along the eastern edge of the mainland. The SLE and the IRL are both located east of the Ten Mile Creek site. Ten Mile Creek drains into the St. Lucie Estuary, which then feeds into the southern Indian River Lagoon. These estuaries provide important habitat for threatened and endangered species and support commercial and recreational fisheries. Wetlands within the Ten Mile Creek project area include forested wetlands, scrub wetlands, and herbaceous wetlands. The area supports a large agriculture industry primarily focused on cattle and citrus.

3.1 VEGETATION

The primary primary cover and habitat types identified in the project study area are citrus grove, swamp and hydric hammock adjacent to the creek, pine flatwoods (immature and mature), pasture, scrub, disturbed area near an old borrow pit, and wetlands.

Citrus grove

There is an active citrus grove under the footprint of the proposed WPA. The citrus grove is vegetated with contains both grapefruit and murcotte orange trees. This old grove is selected to be the deep water storage cell area. Additional vegetation Vegetation in the grove includes day flower, Spanish needles, tassel flower, grasses, and balsam apple vine.

Swamp and hydric hammock floodplain

The swamp is dominated by very tall (60 feet or more) water hickory. Co-dominant and mixed with the hickory are water oaks and live oak. The pPop ash is also found, primarily in the oxbow areas. Within the swamp, cabbage palm is also present, and along the banks of the oxbows the crinum lilly and Carolina willow. Other tree species include cabbage palm. Carolina willow is a common shrub. In much of the swamp, climbing hempweed is common onall over the trees, and the blossoms attract swallowtail butterflies in abundance.

Open water areas supportWithin the creek and along the shoreline, the floating plant wwater lettuce is frequently found. Floating out into the creek is, alligator weed , which is controlled by the introduced flea beetle. Behind that in open areas, sunlight allows and torpedo grass. to be dominant from the shoreline outward. Only one small patch of cattail was found along the creek frontage, but the common reed is present in cleared areas.Small amounts of cattail and common reed are also present.

Flatwoods

The flatwoods in the project footprint (polishing cell area) are dominated by slash pine, up to about which reaches up to 50 feet tall. Saw palmetto is present in the understory. The area appears to be disturbed by both clearing and appearance of the area is disturbed, by clearing and four wheel vehicle movements. Gallberry and *Lyonia sp* is are present in patches. Other areas are dominated by ferns, primarily swamp fern.

The western side of the proposed polishing cell is vegetated with saw palmetto and young slash pines. This area was labeled is considered immature flatwoods, and this area has a great diversity of vegetation. Laurel oak is present, as well as wax myrtle. This area was also the site of the Florida state listed threatened pine lilly or Catesby's lilly.

Pasture

A mixture of grasses and sedges are located in the pasture, that has been selected as the central portion of the polishing cell. Bahia grass is dominant, and carpet grass is dominant where wetland edges are encountered.

Scrub

The scrub is divided into two parts. The northern portion has more open scrub vegetated by palmetto and scrub oaks with much open sandy area. The southern portion, toward the borrow pit lake, is overgrown and has not burned in some time. This portion has oaks that are 13 ft. or taller and is interspersed with saw palmetto and slash pines. Most of it is impenetrable. The scrub area includes a number of active gopher tortoise burrows and is potential indigo snake habitat.

Scrub oaks are interspersed supplemented with Chapman's oak. And There is a wire grass understory. Numerous scrub plants are present in the northern end along with broom sedge, golden rod, and gopher apple. Flowering plants are numerous including blazing star, paint brush, and summer farewell.

Disturbed Area (Borrow pit lake surrounded by berm)

The borrow pit lake was dug for construction of the Florida Turnpike. The shoreline vegetation is cattail. The borrow pit lake total area is covers 10.3 acres. The surrounding berm slope is vegetated by the exotic Brazilian pepper with some wax myrtle. The crown of the berm is vegetated with carpet and bahia grass, and other grasses grazed by horses and cows.

Wetlands in pasture and flatwoods

Within the polishing cell footprint, and primarily within the pasture, are three wetland areas. The Ssurface areawater of these wetlands shrinks and expands with seasonal conditions, and the smaller circular one extends northward beyond

the property boundary. In the center of these areas are of the wetlands a broad leafed marsh, which is primarily dominated mostly by kerel weed, is found. Often this core is surrounded by with M maidencane, an emergent grass. Surrounding that is a diverse group of species including St. Johns wort, beakrush, bog buttons, sweet scent, pipewort, yellow eyed grass, and goldenrod.

In the northeast corner of the flatwoods is a wet area dominated exclusively by the exotic punk tree, *Melaleuca quinquenervia*. In all, existing wetlands under the project's proposed footprint cover 34 acres.

3.2 THREATENED AND ENDANGERED SPECIES

Threatened and endangered species that were encountered on the Ten Mile Creek site included a wood stork and an indigo snake. Florida State listed species encountered included the Catesby's lilly, Gopher tortoise, (Gopherus polyphemus), Sherman's fox squirrel (*Sciurus niger shermani*), Florida sandhill crane (*Grus canadensis pratensis*), and the American alligator (*Alligator mississippiensis*). The endangered and threatened species and species of special concern were listed by observed and potential categories. The Federal and State lists (including Species of Special Concern) were reviewed. A list was prepared using official lists prepared by the Florida Game and Fresh Water Fish Commission, the list provided by the South Florida Water Management District staff, and a list contained in the Upper East Coast Water Supply Plan, and information supplied by the Florida Natural Areas Inventory. A description of the observed and potential species for an inland site in St. Lucie County was prepared. The list appears in Appendix C.

3.3 FISH AND WILDLIFE RESOURCES

A five day wildlife survey was conducted by Carroll and Associates on the Ten Mile Creek site. The objective was to determine the presence or absence of wildlife species in a relatively short time period. This five day procedure is recommended in the Wildlife Methodology Guidelines for Development Approval promulgated by the Florida Game and Freshwater Fish Commission (Allen 1988) when wetlands are part of the project area or property or when upland species of endangered or threatened wildlife are suspected.

Wildlife surveys were performed from October 5 through October 9, 1999. Species lists were incorporated into the report by Carroll (1999). The wildlife searches consisted of five transects, conducted at a different location each day, which were followed each either in morning or evening, and the location varied each time. One of these was in the orange grove, one in the river swamp habitat type, one in the pasture and pine flatwoods, and one in the disturbed area near the Sunshine State Parkway. This survey was performed in some pine flatwoods that are not part of the project area.

The survey results can be compared to a master species list. It was noted that a list of species was prepared for the Upper East Coast area. That list included that totaled 307 vertebrate species, which included 19 amphibians, 47 reptiles, 30 mammals, 170 birds and 41 fish. This survey was also study results was compared to the master lists collected by Mazotti et al. (1992), in his studies of citrus conversion on the Southwest region of Florida. The master list of species was kept in the same order, arrangement, and common name as that found in the publication. The 10 Mile Creek list (although smaller for a 5 day survey than Mazotti's their year long field study) nested into their lists well. The following differences were noted:

1. The Mazotti et al. (1992) study described and listed animals found in old citrus grove, intermediate age grove, and young grove. The 10 Mile Creek study in an old citrus grove had several species that were not listed in the Mazotti et al. (1992) study in this habitat, yet all of them were listed as observed in one of the other age classifications of citrus grove. These species were great blue heron, red-tailed hawk, wild turkey, blue jay, European starling and bobcat. Species not seen at all in citrus grove in that study but found in 10 Mile Creek were the indigo snake (an endangered species), Cuban or brown anole, merlin, downy woodpecker, hairy woodpecker and ovenbird. However, in another table concerned with habitat classification in the study the authors noted describe that the brown anole and oven bird commonly use citrus groves.
2. The Mazotti et al. (1992) study did not encompass all the species noted in this study as far as in the hardwood swamp habitat. However, , however when adjacent habitat types described by the other small habitat types were added, such as willow and myrtle and upland hardwoods, which were also present found in our broader in the Ten Mile creek swamp habitat type then project area, the species diversity lists fit well into their larger published study. In general, the wildlife of the project area can be said to be similar to other citrus areas in South Florida. study.
3. The Pasture and flatwoods habitat types surveyed in the 10 Mile Creek 5 day study, which had a paucity of species, fit nicely into the lists provided in the Mazotti et al. (1992) study for these habitat types. in the classification table. These habitats supported relatively few wildlife species.
4. The scrub habitat type was not described in the Mazotti et al. (1992) study.

3.4 WATER QUALITY

The North St. Lucie River (North Fork) is a relatively large natural river segment that is fed by the Five Mile and Ten Mile Creeks. Ten Mile Creek is the major tributary of the North Fork of the St. Lucie River, an Outstanding Florida Water (OFW). The North Fork flows southward where it widens to form the tidal embayment known as the St. Lucie River Estuary. The Ten Mile Creek basin is

located in the prime grapefruit-producing area of St. Lucie County which has been ranked as first among Florida counties. Because most groves were developed before the advent of modern stormwater treatment systems, runoff in the vicinity flows unimpeded into the North Fork (FDEP; January, 1998).

The runoff from uplands within the Ten Mile Creek basin impacts the St. Lucie estuary by both contributing to salinity level decreases and transporting undesirable constituents into the system. During heavy rains, the rapid influx of runoff contributes to possibly change the system from estuarine to fresh within 24 hours. This rapid salinity change can kill or dislocate brackish-water organisms, disrupting the food chain (FDEP; January, 1998). As an indication of the adverse effects of freshwater discharge, FDEP (January, 1998) documented that the long term (1975-present) mean annual conductivity for the estuary appears to be decreasing at a rate of 282 Siemens/year.

Suspended solids, nutrients, and pesticides comprise the major undesirable constituents that are loaded into the St. Lucie estuary by Ten Mile Creek. Suspended solids are either discrete particles that can settle out of solution rapidly, or substances that less rapidly or never settle out of solution. However the settling velocity of suspended particles is largely a function of particle size. Suspended solids are made up of organic and inorganic particulate matter such as soil and plant matter. In freshwater, clay sized particles may take days or weeks to settle out of suspension. Suspended solids may cover habitats with fine organic materials ("ooze") and also cause turbidity that limits the growth of seagrasses. Muck sediments have been identified as having detrimental impacts to benthic biological communities and to the overlying water column (Taylor Engineering, 1994). Resuspension of these sediments causes nutrient release into the water column and reduces light penetration. Muck sediments also tend to have high oxygen demand and are contributors to depleted dissolved oxygen concentrations in overlying water columns.

In regards to water quality, nitrogen and phosphorus are the two most important nutrients. These nutrients are typically present in stormwater runoff in both dissolved and particulate forms. Nutrient-containing particulate matter can settle to the bottom, decompose, and release nutrients into the water column. Nutrients in stormwater increase biological activity. In fact, an estuarine system often responds to increased dissolved nutrient levels with an increased algal presence. These algal populations are typically measured by chlorophyll concentrations. Furthermore, excess levels of nutrients in the water column generate adverse turbidity and color conditions. In the long term, nutrient-laden sediment accumulation occurs, enabling nutrient recycling, which increases eutrophication (Woodward-Clyde, 1994a).

The reported total nitrogen (TN) and total phosphorus (TP) average concentrations for the C-24 are approximately 1.58 mg/l and 0.26 mg/l, respectively (Woodward-Clyde, 1994). The Florida State Water Quality Summary

305b report (FDEP, 1996) shows a increasing trend for both TN and TP concentrations in the St. Lucie over the 1986 to 1995 reporting period. The average TP concentrations exceed the screening criterion for this parameter in the North St. Lucie sub-basins. In fact, the average reported TP concentration for the entire St. Lucie Estuary exceeds the screening criteria for this nutrient. Trophic state index (TSI) is a commonly applied measure of the extent of eutrophication in a given water body. The TSI computed for the St. Lucie is 60, which indicates moderately poor water quality conditions for an estuary (FDEP, 1996).

Annual pollutant loading estimates for the St. Lucie basin were computed by Woodward-Clyde (1994). Janicki et al (1997) also computed loading estimates for the St. Lucie River basins. For the C-24 canal basin, the Woodward-Clyde and Janicki pollutant load estimates compare favorably. However, the Woodward-Clyde estimates show the C-24 canal contributing approximately 20 percent of the nutrient load to the St. Lucie River basin while the Janicki et al. estimates show that this canal contributes approximately 32 percent of the nutrient loading to the St. Lucie River basin.

For the C-24 canal basin, the TN load calculated from the flow and concentrations taken from Woodward-Clyde (July 1994) is 219,000 kg/year. The estimate for TP is 29,700 kg/year. These loading estimates for C-24 compare favorably with those by Janicki et al. (1997) who estimated the annual TN load to be 259,000 kg/yr and the annual TP load to be 36,600 kg/yr. Using this data, the estimated contribution from the C-24 basin is between 20 and 33 percent of the total non-point load of TN and TP to the St. Lucie River.

Recent sampling for pesticide contamination by the Florida Department of Environmental Protection (Graves, 1995) show violations of water quality standards in the C-24 waterway. In the North Fork of the St. Lucie River concentrations of Simazine (3.5 ppb), Diazinon (0.15 ppb), and Ethion (0.12 ppb) were found to exceed state standards. At the same location, concentrations of pesticides in bottom sediments (Endosulfan II and Ethion) were found at concentrations that indicate the presence of probable toxic conditions. Voluntary reduction in the use of Ethion by citrus growers may play a role in lowering sediment Ethion concentrations (FDEP; January, 1998). The EPA is considering banning or restricting the use of Ethion and other pesticides.

To date, no study has been conducted to quantify the impact of agricultural pesticide loads. However, because of the extensive acreage of agricultural uses in the region surrounding the Ten Mile Basin, it is probable that significant loads occur. This may be especially true in those areas where citrus groves are adjacent to the creek. According to Woodward-Clyde, et al. (1994), it is reasonable to assume that the patterns of pesticides loading would follow those of nutrients or total suspended solids in agricultural areas.

Pesticides are also used for control of mosquito populations, both in mosquito impoundments and in communities adjacent to the Ten Mile Creek Basin. The primary pesticides used in the mosquito impoundments are methoprene, altosid (methoprene briquets), BTI, and Florida larvicides (Rey and Kain, 1989; Provancha, et al., 1992). Malathion has been the principal insecticide used for adult mosquitoes. Windsor and Stewart (1987) reviewed literature which has indicated that Malathion (and closely related Parathion) had not been found in significant amounts in the Indian River lagoon, and that these substances would be expected to break down quickly under the water chemistry conditions of the Lagoon.

3.5 HAZARDOUS, TOXIC AND RADIOACTIVE WASTE

PD-EE will supply

A Phase I Hazardous, Toxic, and Radioactive Waste (HTRW) Site Assessment was conducted in conformance with the scope and limitations of ASTM Practice E 1527. The findings and conclusions provided below reflect existing HTRW conditions based on a HTRW database search, and review of available records. These findings and conclusions are of existing conditions as they are revealed at this time. The project conditions assume that any HTRW found during any phase of the project would be remediated in accordance with local, state and federal laws.

The HTRW database search indicated that the probability of uncovering HTRW contamination is very low. The data indicated that there were no activities performed on the proposed property that would create HTRW.

A large portion of the property considered to be modified or otherwise used for this project is agricultural land. Agricultural activities are exempt from Resource Conservation Recovery Act (RCRA) as section 40 CFR 261.4 (b)(2)(ii) provides an exclusion for agricultural activities. Therefore, the handling, storage and reporting requirements established by RCRA are not applicable. Farm chemical storage and mixing sites are regulated by Federal Insecticide, Fungicide and Rodenticide ACT (FIFRA). The chemicals typically used by farmers are pesticides, fuels and herbicides. Spills or problems associated with farm spill sites are not documented or the HTRW database search conducted during this assessment did not reveal their existence.

PD-EE will supply

3.6 AIR QUALITY

Air quality at Ten Mile Creek is fairly good. Some of the property does border I-95, a major Florida highway so the site is slightly affected by car exhaust. There is no industry on the site that could contribute to adverse air quality.

3.7 NOISE

Noise levels are moderate due to the absence of heavy industry. There is some vehicular noise from the Florida highways and farm machinery.

3.8 AESTHETIC RESOURCES

Waterways, canals and roadways act as corridors containing varying textures, colors, and wildlife. These corridors are often banked by walls of vegetation. Open pasture settings are found where farming and grazing occurs. Much of the site is citrus farming that has altered the natural aesthetics of the area.

3.9 RECREATION RESOURCES

1 of the area is held in private ownership so recreational opportunities are minimal. There is a lake within the polishing cell footprint that contains largemouth bass and bluegills.

3.10 HISTORIC PROPERTIES CULTURAL, HISTORIC, AND ARCHEOLOGICAL RESOURCES

The Corps is coordinating this project with the State Historic Preservation Officer. The Corps conducted a site visit on [January 11, 1999](#) and determined that it is unlikely that this area is a site of potential cultural, historic, and/or archeological resources. The Corps will seek concurrence from the State Historic Preservation Officer. Project construction will not commence until coordination with the SHPO is complete.

3.11 WATER SUPPLY

Ten Mile Creek is used for agriculture water supply. The operation of the creek will not change based on this project.

4. ENVIRONMENTAL EFFECTS

The construction of the WPA is planned for construction in the citrus grove to minimize habitat loss to the flora and fauna of the area. Overall, the citrus grove habitat will be converted to a deep water community. Wetlands in the polishing cell could become deeper, but additional areas will establish wetland plant species. The process of attenuating stormwater flows and possibly augmenting dry season flow back to the St. Lucie Estuary will produce numerous benefits to the estuary including shoal grass and oyster communities, as well as the organisms associated with these species.

General but transient effects of project construction include additional traffic on local roads, noises generated by heavy earth-moving machinery, and possibly

some additional dust incidental to land-clearing, disposal of excess excavated material, excavation, grading and construction

4.1 VEGETATION

The following paragraphs describe the environmental impacts of the proposed project. The project plan is defined as the two pool plan described above, having consists of constructing a deep WPA with a shallower polishing cell.

The elevation contours of the proposed reservoir are key to making predictions of vegetation zones in the new reservoir. Other controlling factors will be as well as the best available information from the district on water control elevation, stage duration, and operational criteria, to be provided by the South Florida Water Management District (SFWMD). The better the operational criteria, and the finer the contour information, the better the prediction of vegetation type. For purposes of this discussion and for predictive purposes we will divide the area into the deep water storage cell area and then the polishing cell area. Within each reservoir we will attempt to describe the location, areal extent, and expansion or contraction of vegetation types. We will also discuss changes in species.

Deep water storage cell

The deep water storage cell is expected to fluctuate between ground level and + 110 feet, within in a one year period (Dry to capacity). This fluctuation will all occur inside within the levees. No perennial rooted, aquatic plants are likely to be able to survive water level fluctuations of this magnitude, but some annuals will probably establish during the dry-season drawdowns of the WPA, and some floating aquatic plants are also expected to establish. The system will be taxing to all rooted aquatic plants and only the most hardy, exotic, or weedy species will be able to take root and survive these conditions. Therefore, it is expected that large areas will have no rooted aquatic plants, especially in the first few years of operation. There should be colonization along the top of the berm, but the berm slope may be difficult to vegetate.

Algae

Single celled and filamentous algae will be a strong component of the aquatic system, which will have sufficient nutrient levels high enough to encourage growth of algae in the open water.

Floating aquatics.

Water lettuce, *Pistia* sp., will be one of the species pumped in and inhabiting the reservoir since it is abundant in Ten Mile Creek. Water lettuce will find conditions that are suitable for growing except for the wind and resultant wave action. These

waves will tend to move any growing water lettuce to the side of the reservoir and perhaps wind-row this vegetation at times during strong winds.

The water hyacinth, not prevalent in Ten Mile Creek, will act in the same manner as the water lettuce. It will increase in abundance as the reservoir ages. Chemical control of this species is usually undertaken as management of this type of area is performed to allow public access.

Various species of duckweed, *Lemna* sp., will also be present in the reservoir and be able to take advantage of the high nutrient levels. This very small floating plant will be able to take advantage of any calm areas and will not be as subject to being thrown ashore by wind as the other floating aquatics.

Emergent plants

The most likely emergent plants that will grow along the edge of the reservoir are the following: maidencane, alligator weed, torpedo grass and cattail. The first three species are found along the edges of Ten Mile Creek in abundance in open areas with no tree canopy. Only one patch of cattail was noted there, however, it is one of the prime species found in reservoirs where citrus grove runoff is collected, and is known for its ability to take up nutrients. It also has the ability to float and stream out from the edges of a reservoir starting a plant community that would include the floating aquatic plants and the other emergents mentioned above. Torpedo grass tends to dominate areas that are not already vegetated with other species like maidencane.

Submerged aquatics

The most likely submerged aquatic plant in this type of deep water reservoir with high nutrient conditions is the exotic *Hydrilla*. While southern naiad can thrive in low nutrient conditions, Hydrilla is known to grow in reservoir areas with agricultural runoff water sources, provided water clarity permits. Hydrilla can grow from the bottom in 12 feet of water, and in some locations will continue growing on the water surface, and eventually solarize or wilt and die from exposure to the sun in summer. The source of this plant in the basin is unknown, therefore, it may take a few years for this plant to appear (it will be dependent on some bird or human to bring it into the reservoir). The plants Hydrilla's spread would also be dependent on control of any surface floating aquatic plants which could shade it out.

Polishing cell

It is more difficult to predict Predictions of changes in the conditions in the polishing cell will be more problematic. The topographic information available provided is largely in increments of two feet. The proposal is to hold water 3 or 4 feet above natural ground elevation, but that elevation has not yet been

calculated. The range of existing habitats from includes wetlands, to pasture, to flatwoods, and then to scrub. This indicates a substantial range in the natural ground elevations at the site for Florida. The addition of disturbed areas in the form of a borrow pit lake with surrounding berm and roadways, inside the area destined for the polishing cell, further complicates the topographic setting.

Open water

The polishing cell will have less open water area than the WPA. The old borrow pit will definitely remain an open water system, as well as will the ditches and canals. The deepest of the wetland areas (now vegetated with broad leaved emergent marsh and maidencane) are expected to begin to at least start as open water areas, for they will be in about 4 to 5 feet in depth deep when the polishing cell is inaugurated.

Floating Aquatic Vegetation

Floating aquatic vegetation is likely to be a strong component of the polishing cell vegetation. Since emergent vegetation will be dominant, floating vegetation will be present between patches of emergent and along the edges of open water. Species composition will be similar to the WPA.

Emergent vegetation

Emergent vegetation will be dominant in the polishing cell. Species like maidencane, alligator weed, and torpedo grass will be aggressive colonizers. Cattail will be present because of its airborne seeds. Cattail will be concentrated near the outfall from the deep water storage cell and spreading outward with time because of this plant's ability to use nutrients and expanding with inundation. There will be a diversity of other emergent vegetation, including pickerelweed and arrowhead, several rushes, and beakrushes. Water primrose and smartweed will also be present because of the seed source in the basin. The woody species such as like primrose willow, and Carolina willow will eventually establish themselves be present in patches, but their establishment may take several years as well.

The scrub habitat and berm around the borrow pit lake will be covered with the species described above, but will also have an opportunity for more provide greater habitat diversity, because the area will dry out on a regular basis. Species like cypress and bulrush need this drying to become established.

Submerged aquatic vegetation

Submerged aquatic vegetation will be abundant and will include southern naiad, coontail, bladderwort, *Chara*, and *Hydrilla*. Water lily and spatterdock will also be present because of favorable water depths.

Estuarine Vegetation

Seagrass, primarily shoal grass and some macroalgae will increase in the SLE. This project, combined with the IRL Feasibility Study will return certain areas of the SLE vegetation to healthy, sustainable levels.

4.2 THREATENED AND ENDANGERED SPECIES

Indigo snakes and wood storks are known to inhabit the area. During project activities, all precautions will be taken to eliminate any potential danger to these species. The USFWS has concurred in the 2 March 1999 letter with the Corps that no adverse impacts to this species are expected, provided that the Corps includes the standard protection measures for the indigo snake. The Catesby lily will be directly impacted by raising the water levels in the polishing cell. The scrub area containing gopher tortoise's will be avoided or minimized to the greatest extent possible. Any gopher tortoises encountered will be protected. Standard indigo snake protection measures will be incorporated into the project plans and specifications.

4.3 FISH AND WILDLIFE RESOURCES

The fish and wildlife resources in the footprint of the WPA will change from citrus grove fauna to an open water system. Preyfish species such as centarchids (sunfish) and mosquitofish will quickly colonize the WPA. As the WPA levels decrease these fish can act as forage for wading birds, raccoons and other small mammals, and other organisms. The WPA will also support reptiles and amphibians including salamanders and turtles.

The polishing cell fauna will stay the same with possibly the addition of a number of organisms suited for shallow water conditions (3-4 feet). Since these conditions currently exist in the wetlands of the polishing cell, increased numbers will occur because of a potentially larger amount of this type of habitat.

The downstream benefits to the SLE will include the initial step in returning the SLE back to a healthy and sustainable ecosystem. With a decrease in the size and frequency of freshwater pulses, the waters of the estuary should become clearer and more saline. The estuary is expected to then be able to support shoal grass and oysters and other typical elements of the estuarine fauna. the communities that these organisms are indicators of. In order to fully restore the Indian River Lagoon, however, the proposed project will have to act as one part of the The important point to consider her is that this project needs to be combined with the improvements recommended in the IRL Feasibility Study, in order to fully return the SLE to a healthy ecosystem and ultimately maximize estuarine benefits. Once the SLE is restored, the IRL system in that area should yield secondary benefits to the nearby seagrass beds.

4.4 WATER QUALITY

The intent of the Ten Mile Creek Water Preserve Area project is to attenuate stormwater flows into the North Fork of the St. Lucie River. These flows, which originate in the Ten Mile creek basin, are to be captured and stored in a deep water storage area and subsequently pumped into a polishing pond before release back into the creek. The resulting hydrodynamic, physical, and biological treatment is expected to ultimately result in the reduction of undesirable freshwater loads being delivered to the St. Lucie estuary.

As alluded to above, the anticipated water quality improvements are to occur in response to a two-phase treatment approach. The first phase consists of the use of a 550 acre deepwater storage area that borders Ten Mile Creek to the north and northwest. During high discharge events, a prescribed portion of flow will be captured from the Ten Mile Creek and pumped up gradient into the deepwater storage area. This would then flow into a 134 acre polishing pond before being released into Ten Mile Creek.

After polishing pond treatment, the project is expected to provide relief to the St. Lucie Estuary from damaging freshwater discharges. Implementation of this project would greatly enhance the ability to maintain appropriate salinity in the North Fork Aquatic Preserve and offset the damaging effects of Lake Okeechobee flood releases until other components of the Comprehensive Plan for the C&SF Project can be implemented.

White (1999), in his analysis of the potential effects of upland impoundment water preserve areas (WPA) on the St. Lucie Estuary, found that desired, albeit marginal, Wet Season salinity increases could be achieved. However, according to model results, Dry Season Post-WPA implementation was too inadequate to avert the undesired increase in salinity in the majority of the system. The success or failure of WPA implementation hinged on the sizing and management of the proposed upland impoundments.

Deep water storage area treatment would reduce sediment, nutrient, and pesticide loads delivered to the St. Lucie Estuary. According to Wanielista and Yousef (1993), one inch of Central Florida rainfall captured in a stormwater treatment area (STA) treats approximately 50 percent of the annual runoff. Shafer (USACE; 1998) produced pollutant removal estimates for On-site Detention Ponds proposed for the St. Lucie River drainage basin by assuming a 72-hour residence time, 90 percent removal of sediments, 50 percent removal of nutrients, and 50 percent removal of heavy metals. Shafer found that the overall pollutant removal effect of mandating on-site stormwater treatment ponds at new and existing agricultural sites within the St. Lucie Estuary basin would reduce suspended solids loads by 33 percent, nutrients by 18 percent, and metal loads by approximately 16 percent.

The above findings are consistent with claims made by Carroll and Associates (February, 1999) that the deep water storage cell will remove about 25% of the Nitrogen and Phosphorous loads in the inflow water largely by sedimentation. Furthermore, depositions of this organic material are expected to incorporate these elements into the sediments at the bottom of the reservoir, and they will begin forming a rich sediment layer. As long as these reservoirs are managed so that drying is avoided, these nutrients will be bound to the sediments and kept there.

The polishing cell will remove nutrients by incorporating them into the aquatic plant biomass within the reservoir. Phosphorus is removed by adsorption, absorption, complexation, and precipitation in wetlands. Studies have shown a general rate of phosphorous removal capability (or settling rate) of about 1 to 8 grams per meter square per year for such shallow water systems on a continuing basis. If plants die, then nutrients are released (unless they are mechanically harvested); therefore this condition should be avoided. The Boney Marsh in the Kissimmee River basin achieved a reduction of 62% of Total Phosphorus. The Everglades Nutrient Removal Project has achieved an 80% reduction of Total Phosphorous when compared to the inflow water; similarly, a removal rate of 60 to 80% should be possible as a result of implementation of the prescribed polishing cell.

In order to verify the above removal rate projections for the proposed polishing cell, an U.S. Army Corps of Engineers Waterways Experiment Station (WES) wetland water quality model was utilized. The PREWet screening-level mathematical model was used to estimate the amount of pollutant removal provided by a wetland. The PREWet model addressed suspended solids, total nitrogen, total phosphorus, and organic chemicals (pesticides, as represented by Dieldrin).

The PREWet simulation included the entire projected volume of waters captured from Ten Mile Creek. Contaminant removals for the deep water storage area were not included in model inputs due to the fact that raw loadings from the creek have not been quantified. Consequently, the output from the PREWet simulation is representative of a scenario in which the proposed polishing pond is being used to clean untreated stormwater. As a result, the outputs shown on Table 4.11 are likely indicative of a low-efficiency treatment event for the polishing pond. This means that, given the above removal percentages provided by Shafer, suspended solids removal should exceed 70%, total nitrogen removal should exceed 90%, total phosphorus removal should approach 25%, and pesticides removal should exceed 90% when captured flow is routed through the entire treatment system. The PREWet simulation yielded an unusually low total phosphorus removal percentage. This is likely due to the fact that the model was not run with pre-treated stormwater--a condition that probably overwhelmed the simulated treatment capacity of the polishing pond to assimilate phosphorus.

4.5 HAZARDOUS, TOXIC AND RADIOACTIVE WASTE

The completed project will not effect any HTRW material. The Corps of Engineers policy regarding HTRW when found on property under civil works construction program requires that all HTRW contamination be remediated. Any HTRW found during any phase of the project would be remediated in accordance with local, state and federal laws.

It can be assumed that the project condition will be contamination free or of low levels that would include de minimis conditions that generally do not present a material risk of harm to public health or the environment.

4.6 AIR QUALITY

Due to construction, there could be a temporary disruption of air quality. Local weather patterns should disperse the exhaust, and regional air quality standards will not be violated.

4.7 NOISE

The completed project will not affect noise in the area. During construction there may be a slight increase of noise from machinery, but this increase will be short-term.

4.8 AESTHETIC EFFECTS

Most adverse impacts on regional aesthetics will occur during construction. These construction impacts would be short-term and the polishing cell and WPA should provide aesthetic appeal by attracting migratory aquatic species and wading birds. Aesthetic benefits to the St. Lucie Estuary will be attained when a healthy sustainable estuary is restored through the addition of the native flora and fauna.

4.9 RECREATION

The project will increase recreational opportunities in the area. The WPA and polishing areas could provide hiking and fishing opportunities to local residents and tourists. A sustainable SLE will provide increased levels of fish including recreationally important species such as spotted seatrout, red drum, snook, tarpon, oysters and many others.

4.10 CULTURAL, HISTORIC, AND ARCHEOLOGICAL RESOURCES

Based on a January 11, 1999 site visit and subsequent literature review, the Corps has determined that there is little likelihood of the presence of historic resources eligible for the National Register of Historic Properties. However,

coordination with the State Historic Preservation Officer is ongoing and additional investigations (if needed) will be done to determine potential impacts, if any. Project construction will not commence until coordination with the SHPO is complete.

4.11 WATER SUPPLY

Water supply will not be affected. Water pumped into the WPA would be stormwater normally lost to tide. Local groundwater recharge would be expected to increase, possibly offsetting some effects of agricultural withdrawals on adjoining lands.

4.12 SOCIO-ECONOMIC

The economic benefits derived from the improvement of the recreational and commercial fisheries in the St Lucie Estuary and the lower IRL are believed to be much greater than the loss of income that will be caused by removing the citrus grove, pastures, and other agricultural lands under the project footprint from production.

4.13 LAND USE

Ten Mile Creek and its floodplain vegetation will remain essentially the same. Water withdrawals to the WPA will be made from run-off water that is now destined to be dumped/discharged to the estuary. The only land use changes caused by the project will be the loss of agricultural lands under the project's own footprint from the agriculture base of the county.

, therefore this will cause no recognizable change in that area.

The citrus grove will be flooded and used as a deep water storage cell. The trees will be removed. No vegetation present there is likely to survive the flooding to ten feet in depth. A whole new aquatic system will be established that is comprised of species adapted to withstand deep water. Citrus harvesting will cease, however we expect it to continue on adjoining properties to the north and west.

The polishing cell area is presently used as pasture. All the habitat types inside this area will be changed as part of the transition to shallow water reservoir (wetlands and open waters) which will become a marsh,. except for tThe borrow pit lake which will have the least amount of change (just limited to greater water depths) become deeper. The entire area will be underwater and become marsh or open water wetland unsuitable for grazing uses.

4.14 CUMULATIVE IMPACTS

This project, combined with other proposed WPA's in the IRL feasibility Study, will not result in cumulative negative impacts to the system. Actually, the combined operation of the proposed WPA's in the IRL Feasibility Study will act cumulatively to return the SLE to a sustainable natural system.

4.15 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The proposed construction of this WPA could represent an irreversible and irretrievable commitment of land and monetary resources. These monetary resources would include state and federal funding, labor, energy, materials and equipment to construct and maintain the WPA.

4.16 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

The Ten Mile Creek WPA alone will not meet the proposed salinity envelope for the SLE. Additional WPA's in St. Lucie and Martin Counties will be needed, as well as, on-site retention/detention of storm waters.

This WPA and polishing cell will modify land use by converting an agricultural terrestrial system into an aquatic system composed of aquatic birds, fish, invertebrates, reptiles, and amphibians.

4.17 ENVIRONMENTAL COMMITMENTS

The U.S. Army Corps of Engineers and contractors commit to avoiding, minimizing or mitigating for adverse effects during construction activities by including the following commitments in the contract specifications.

The majority of the Resource Category 1, Florida scrub habitat, located in the proposed polishing cell be excluded from the project by relocating the polishing cell levee southward in proximity to the existing borrow pit.

Management guidelines for the eastern indigo snake should be incorporated during the construction phase of the project.

The deep water storage area will be excavated to below groundwater so as to not dry out. The polishing cell should be operated to optimize growth of emergent vegetation. The establishment of emergent wetland vegetation containing tall (1 meter) sedges, grasses, and forbs has a maximum water elevation of 1.3 ft. with a 250 day maximum hydroperiod (SFWMD 1995). Operation of the polishing cell should be conducted to ensure that the hydroperiod and water elevations are adequate to facilitate emergent plant growth.

4.18 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

4.18.1 National Environmental Policy Act of 1969

Environmental information on the project has been compiled and a draft Environmental Assessment, dated June, 1999, has been prepared. The project is in compliance with the National Environmental Policy Act.

4.18.2 Endangered Species Act of 1973

Consultation was initiated with NMFS on 28 February 1999. Consultation was initiated with USFWS on 18 February 1999, and completed on 2 March 1999. This project was fully coordinated under the Endangered Species Act and is therefore, in full compliance with the Act.

4.18.3 Fish and Wildlife Coordination Act of 1958

This project has been coordinated with the U.S. Fish and Wildlife Service (USFWS). A draft Coordination Act Report (CAR) dated April 1999 was submitted by the USFWS. There has been no change in the project design since submittal of the CAR. This project is in full compliance with the Act.

4.18.4 NATIONAL HISTORIC PRESERVATION ACT OF 1966 (INTER ALIA)

This project is being coordinated with the State Historic Preservation Office (SHPO). Full compliance will be achieved upon concurrence of no effect by SHPO. Project construction will not commence until coordination with the SHPO is complete.

4.18.5 Clean Water Act of 1972

The project is in compliance with this Act. A Section 401 water quality certification issued by the Florida Department of Environmental Protection (DEP) permit will be applied for during detailed design. All State water quality standards would be met. A Section 404(b) evaluation is included in this report as Appendix A.

4.18.6 Clean Air Act of 1972

This project has been coordinated with U.S. Environmental Protection Agency (EPA) and is in compliance with Section 309 of the Act.

4.18.7 Coastal Zone Management Act of 1972

A federal consistency determination in accordance with 15 CFR 930 Subpart C is included in this report as Appendix C. State consistency review was performed during the coordination of the draft EA and the State has determined that, at this stage, the project is consistent with the Florida Coastal Zone Management.

4.18.8 Farmland Protection Policy Act of 1981

No prime or unique farmland would be impacted by implementation of this project. This act is not applicable.

4.18.9 Wild and Scenic River Act of 1968

No designated Wild and Scenic river reaches would be affected by project related activities. This act is not applicable.

4.18.10 Estuary Protection Act of 1968

The project will provide benefits to the SLE and IRL.

4.18.11 Federal Water Project Recreation Act

The principles of the Federal Water Project Recreation Act, (Public Law 89-72) as amended, have been fulfilled by complying with the recreation cost sharing criteria as outlined in Section 2 (a), paragraph (2).

4.18.12 Fishery Conservation and Management Act of 1976

The project has been coordinated with the National Marine Fisheries Service (NMFS) and is in compliance with the act (see letter dated 16 March 1999] in Appendix B from NMFS).

4.18.13 Submerged Lands Act of 1953

The project would occur on submerged lands of the State of Florida. The project has been coordinated with the State and is in compliance with the act.

4.18.14 Rivers and Harbors Act of 1899

The proposed work would not obstruct navigable waters of the United States. The proposed action has been subject to the public notice, public hearing, and other evaluations normally conducted for activities subject to the act. The project is in full compliance.

4.18.15 Anadromous Fish Conservation Act

Anadromous fish species would not be affected. The project has been coordinated with the National Marine Fisheries Service and is in compliance with the act.

4.18.16 Migratory Bird Treaty Act and Migratory Bird Conservation Act

No migratory birds would be affected by project activities. The project is in compliance with these acts.

4.18.17 E.O. 11990, Protection of Wetlands

This project has minimized any effects to area wetlands and is compliance.

4.18.18 E.O. 11988, Flood Plain Management

The project is in the base flood plain (100-year flood) and has been evaluated in accordance with this Executive Order. The project is in compliance.

4.18.19 E.O. 12898, environmental justice

This project will not result in adverse human or environmental health and ultimately will help to return the SLE to a sustainable ecosystem.

4.18.20 E.O. 13089, CORAL REEF PROTECTION

This project will not effect any coral reefs.

5. LIST OF PREPARERS**5.1 PREPARERS**

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6. PUBLIC INVOLVEMENT/Agency coordination

The proposed project has been coordinated with the following agencies: US Fish and Wildlife Service, National Marine Fisheries Service, St. Lucie County, Martin County, US Environmental Protection Service, Florida State Historic Preservation Officer, South Florida Water Management District, Florida Department of Environmental protection, and various other local, state and federal agencies. The draft EA will also be circulated with the interested party. A mailing list of all interested parties will be kept in Jacksonville.

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APPENDIX A - SECTION 404(B) EVALUATION

SECTION 404(b) EVALUATION

Ten Mile Creek

Water Preserve Area

I. Project Description

a. Location. The proposed Ten Mile Creek Water Preserve Area (WPA) is situated just south of Ten Mile Creek and southwest of Ft. Pierce in St. Lucie County, FL. The planned WPA will be located immediately west of the crossing Florida's Turnpike and Interstate-95 and south of Highway 70 (Okeechobee Road) and north of Midway Road (see figure 1, vicinity map). The low level salinity control structure for Ten Mile Creek is less than one-half mile east of the proposed water preserve area site.

b. General Description

Storm water storage is essential to this action. The proposed action is to construct a two stage detention system. A series of large pumps would be used to deliver waters from Ten Mile Creek into WPA during high water conditions

when water is readily available. Estimates of pump capacity are 380 cfs. Water would be stored in the 554 acre deep water storage cell and then metered out through structures into a polishing cell which is smaller in size (134 acres) and shallower in depth. The deep water storage cell would be kept up to ten feet deep allowing storage of approximately 5000 acre-feet of water. Soil areas (best for dike building) will be excavated by heavy equipment and used for dike construction. The height of the levee around the deep water storage cell will be 12 to 15 feet above surrounding natural ground, whereas the polishing cell levee height would be much less (6.5 feet above grade) (See figure 1&2, vicinity map and project plan view). A 650 ft. overflow weir, consisting of capped sheet pile and riprap will be located within the exterior levee downstream of the pumping station. Water would be delivered from the WPA to the polishing cell through a spillway (500cfs capacity). After the water has been in the polishing area, box culverts will feed an outlet channel back to Ten Mile Creek.

Flows of cleaner water would be delivered back to Ten Mile Creek downstream of the Gordy Road structure, to achieve a more favorable and natural hydrologic regime. Sediment loads will be reduced in these deliveries to the St. Lucie Estuary. The polishing cell would act to further reduce nutrient loads in these deliveries. Stored water can also be released in the drier winter months when low or no flow periods often occur.

c. Authority and Purpose. The proposed Ten Mile Creek Water Preserve Area Critical Project was authorized under section 528 of the Water Resources Development Act of 1996, by Public Law 103-404.

d. General Description of Dredged or Fill Material.

General Characteristics of Material. The material is primarily sand. More detailed information will be determined during detailed design.

(2) Quantity of Material. Approximately 1,780,000 cubic yards (cy).

(3) Source of Material. The material to create the berm will be excavated from the interior of the WPA.

e. Description of the proposed Discharge Site.

(1) Location. The fill will be used to construct the berm walls for the WPA and polishing cell (see figure 2).

(2) Size. The WPA site is approximately 554 acres currently in citrus and the polishing cell is 134 acres currently pasture and marginal wetlands.

(3) Type of Site. The site is citrus and a mixture of wetland communities, pasture, and pine flatwoods.

(4) Type of Habitat. The WPA was a citrus grove and the polishing cell was pasture, wetlands, and pine-flatwoods.

(5) Timing and Duration of Discharge. The construction starting date and length of time needed to complete the work has yet to be determined.

f. Description of Disposal Method. The mechanical discharge method will be used.

II. Factual Determinations

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope. The height of the levee around the deep water storage cell will be 12 to 15 feet above surrounding natural ground, whereas the polishing cell levee height would be much less (6.5 feet above grade) (See figure 1, vicinity map and figure 2, project plan view). Water would be delivered from the deep water storage cell by a spillway structure to the Polishing cell. Box culverts will be used to release water to Ten Mile Creek.

(2) Sediment Type. The excavation material from the citrus grove will be used for the WPA and polishing cell levees. The soil composition has not been determined, but will be analyzed during detailed design.

(3) Dredge/Fill Material Movement. The fill material will be stabilized and the berm should not be subject to any movement except for minor wind erosion.

(4) Physical Effects on Benthos.

b. Water Circulation, Fluctuation and Salinity Determination.

(1) Water Column Effects. The water column in the WPA will be temporally filled according to rainfall patterns and the proposed salinity envelop for the SLE.

(2) Current Patterns and Circulation. Water will be pumped from Ten Mile Creek into the WPA during high flow events. Water will be released from the WPA to the polishing cell and then to 10 Mile Creek when needed during the dry season.

(3) Normal Water Level Fluctuations and Salinity Gradients. Water level fluctuations in the WPA will be rainfall based for the surrounding basin. Water levels in Ten Mile Creek will fluctuate in accordance with the operation of the WPA.

c. Suspended Particulate/Turbidity Determinations.

(1) Expected Changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Disposal Site. The construction will cause a temporary, but insignificant increase in the turbidity and suspended solids in 10 Mile creek.

(2) Effects on the Chemical and Physical Properties of the Water Column.

(a) Light Penetration. Light penetration in 10 Mile creek may be temporally obstructed during construction.

(b) Dissolved Oxygen. If discharges effect 10 Mile Creek, then dissolved oxygen may decrease due to increased biological demand.

(c) Toxic Metals, Organics, and Pathogens. No toxic metals, organics, or pathogens are expected to be released by this project.

(d) Aesthetics. During construction, a temporary disruption of the aesthetics of the area will occur.

(3) Effects on Biota.

(a) Primary Productivity and Photosynthesis. The temporary turbid conditions may effect primary productivity, but no long term effect is expected.

(b) Suspension/Filter Feeders. No significant effect is expected.

(c) Sight Feeders. No significant effect is expected.

d. Contaminant Determinations. No significant effect is expected.

e. Aquatic Ecosystem and Organism Determinations. No significant effect is expected.

(1) Effects on Plankton. Plankton levels in the area will increase due to the construction of the WPA. No significant effect is expected to the Plankton in the polishing cell.

(2) Effects on Benthos. Benthos levels in the area will increase due to the construction of the WPA. No significant effect is expected to the bethos in the polishing cell.

(3) Effects on Nekton. Nekton levels in the area will increase due to the construction of the WPA. A small increase is expected to the Nekton in the polishing cell.

(4) Effects on the Aquatic Food Web. The polishing cell aquatic food web should not see any significant effects. The WPA will support a deep water food web.

Effects on Special Aquatic Sites.

(a) **Hardground and Coral Reef Communities.** No hardgrounds are located in the project.

Endangered and Threatened Species. Section 7 consultation is under way. A review of the US endangered and threatened species list, published by USFWS, revealed that the following species could frequent or reside in the project area: Wood stork, Arctic Peregrine falcon, Bald eagle, Red-cockaded woodpecker, Florida everglade kite, Eastern indigo snake, and the American alligator. An indigo snake and wood stork were observed in the project footprint. The Corps has concluded that the project will have no effect on any of the species. The USFWS has concurred with the no effect determination in a letter dated 2 March 1999. NMFS has concurred with the Corps no effect determination in a letter dated 16 March 1999.

(7) **Other Wildlife.** A short term interruption of wildlife will occur during construction. Upon construction completion a change in species from citrus grove inhabitants to water organisms will occur in the WPA. No adverse impacts to wildlife in general is expected.

(8) **Actions to Minimize Impacts.** All practical safeguards during construction will be taken to preserve and enhance environmental, aesthetic, and economic values in the project area. Standard indigo snake construction protection parameters will be included.

f. Proposed Disposal Site Determinations.

(1) **Mixing Zone Determination.** The receiving zone is composed of the same material as the construction area, therefore, there will be no mixing zone of dissimilar material.

(2) **Determination of Compliance with Applicable Water Quality Standards.** No effect on water quality is expected. Coordination with the state of Florida is in progress and the selected plan will be in compliance following the issuance of the state water quality certificate.

(3) **Potential Effects on Human Use Characteristics.**

(a) **Municipal and Private Water Supplies.** No municipal or private water supplies will be impacted by the project.

(b) **Recreational and Commercial Fisheries.** During construction no significant effect is expected. Long term fisheries health in the SLE should increase due to this project.

(c) Water Related Recreation. No significant effect is expected.

(d) Aesthetics. No significant effect on human aesthetics is expected.

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. Coordination with the State Historic Preservation Officer is in process and it appears that there are no significant cultural resources to be effected at this site.

(g). Determination of Cumulative Effects on the Aquatic Ecosystem. The cumulative effect of this WPA and the proposed WPA's in the IRL Feasibility Study are to reduce the high flows to the estuary and augment dry season flows to the estuary. The combination of these project features will help restore the SLE to a healthy sustainable estuary.

h. Determination of Secondary Effects on the Aquatic Ecosystem. There are no significant secondary effects expected.

III. Findings of Compliance or Non-compliance with the Restrictions on Discharge.

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. No practicable alternative exists which meets the study objectives that does not involve discharge of fill into waters of the United States.

c. After consideration of disposal site dilution and dispersion, the discharge of fill materials will not cause or contribute to, violations of any applicable State water quality standards for Class III waters. The discharge operation will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

d. The excavation of material will not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973, as amended.

e. The placement of fill material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic species and other wildlife will not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values will not occur.

f. On the basis of the guidelines, the proposed disposal site for the discharge of dredged material is specified as complying with the requirements of these guidelines.

APPENDIX B - PERTINENT CORRESPONDENCE

APPENDIX C - COASTAL ZONE MANAGEMENT CONSISTENCY

FLORIDA COASTAL ZONE MANAGEMENT PROGRAM

FEDERAL CONSISTENCY EVALUATION PROCEDURES

Ten Mile Creek

Water Preserve Area

Ft. Pierce, Florida

1. Chapter 161, Beach and Shore Preservation. The intent of the coastal construction permit program established by this chapter is to regulate construction projects located seaward of the line of mean high water and which might have an effect on natural shoreline processes.

Response: The proposed project does not effect the shoreline.

2. Chapters 186 and 187, State and Regional Planning. These chapters establish the State Comprehensive Plan which sets goals that articulate a strategic vision of the State's future. It's purpose is to define in a broad sense, goals, and policies that provide decision-makers directions for the future and provide long-range guidance for an orderly social, economic and physical growth.

Response: The proposed project has been coordinated with Federal, State and local agencies during the planning process. The project meets the primary goal of the State Comprehensive Plan through preservation and protection of the development and infrastructure.

3. Chapter 252, Disaster Preparation, Response and Mitigation. This chapter creates a state emergency management agency, with the authority to provide for the common defense; to protect the public peace, health and safety; and to preserve the lives and property of the people of Florida.

Response: The proposed project involves creating a WPA that will help to attain a healthy SLE. This project would be consistent with the efforts of Division of Emergency Management.

4. Chapter 253, State Lands. This chapter governs the management of submerged state lands and resources within state lands. This includes archeological and historical resources; water resources; fish and wildlife resources; beaches and dunes; submerged grass beds and other benthic communities; swamps, marshes and other wetlands; mineral resources; unique natural features; submerged lands; spoil islands; and artificial reefs.

Response: The proposed WPA would start to create a healthy SLE. The proposed project would comply with the intent of this chapter.

5. Chapters 253, 259, 260, and 375, Land Acquisition. This chapter authorizes the state to acquire land to protect environmentally sensitive areas.

Response: Land acquisition is underway. This project is consistent with this chapter.

6. Chapter 258, State Parks and Aquatic Preserves. This chapter authorizes the state to manage state parks and preserves. Consistency with this statute would include consideration of projects that would directly or indirectly adversely impact park property, natural resources, park programs, management or operations.

Response: The proposed project area does not contain any state parks or aquatic preserves nor are there any within the immediate vicinity of the project that would be affected. The project is consistent with this chapter.

7. Chapter 267, Historic Preservation. This chapter establishes the procedures for implementing the Florida Historic Resources Act responsibilities.

Response: This project is being coordinated with the State Historic Preservation Officer (SHPO). Historic Property investigations were conducted in the project area. An archival and literature search were conducted. The project will be consistent with the goals of this chapter.

8. Chapter 288, Economic Development and Tourism. This chapter directs the state to provide guidance and promotion of beneficial development through encouraging economic diversification and promoting tourism.

Response: The proposed WPA would start to provide a healthy SLE. This would be compatible with tourism for this area and therefore, is consistent with the goals of this chapter.

9. Chapters 334 and 339, Public Transportation. This chapter authorizes the planning and development of a safe balanced and efficient transportation system.

Response: No public transportation systems would be impacted by this project.

10. Chapter 370, Saltwater Living Resources. This chapter directs the state to preserve, manage and protect the marine, crustacean, shell and anadromous fishery resources in state waters; to protect and enhance the marine and estuarine environment; to regulate fishermen and vessels of the state engaged in the taking of such resources within or without state waters; to issue licenses for the taking and processing products of fisheries; to secure and maintain statistical records of the catch of each such species; and, to conduct scientific, economic, and other studies and research.

Response: The proposed project will lead to the management of a healthy sustainable SLE. Based on the overall impacts of the project, the project is consistent with the goals of this chapter.

11. Chapter 372, Living Land and Freshwater Resources. This chapter establishes the Game and Freshwater Fish Commission and directs it to manage freshwater aquatic life and wild animal life and their habitat to perpetuate a diversity of species with densities and distributions which provide sustained ecological, recreational, scientific, educational, aesthetic, and economic benefits.

Response: The project will provide benefits to freshwater and estuarine aquatic life.

12. Chapter 373, Water Resources. This chapter provides the authority to regulate the withdrawal, diversion, storage, and consumption of water.

Response: This project will attenuate stormwater during peak events and when available provide freshwater to the estuary when needed during the dry season. The project is consistent with the goals of this chapter.

13. Chapter 376, Pollutant Spill Prevention and Control. This chapter regulates the transfer, storage, and transportation of pollutants and the cleanup of pollutant discharges.

Response: The contract specifications will prohibit the contractor from dumping oil, fuel, or hazardous wastes in the work area and will require that the contractor adopt safe and sanitary measures for the disposal of solid wastes. A spill prevention plan will be required.

14. Chapter 377, Oil and Gas Exploration and Production. This chapter authorizes the regulation of all phases of exploration, drilling, and production of oil, gas, and other petroleum products.

Response: This project does not involve the exploration, drilling or production of gas, oil or petroleum product and therefore, this chapter does not apply.

15. Chapter 380, Environmental Land and Water Management. This chapter establishes criteria and procedures to assure that local land development decisions consider the regional impact nature of proposed large-scale development.

Response: The proposed project will not have any regional impact on resources in the area. Therefore, the project is consistent with the goals of this chapter.

16. Chapter 388, Arthropod Control. This chapter provides for a comprehensive approach for abatement or suppression of mosquitoes and other pest arthropods within the state.

Response: The project will not further the propagation of mosquitoes or other pest arthropods.

17. Chapter 403, Environmental Control. This chapter authorizes the regulation of pollution of the air and waters of the state by the Florida Department of Environmental Regulation (now a part of the Florida Department of Environmental Protection).

Response: A draft Environmental Assessment addressing project impacts has been prepared and will be reviewed by the appropriate resource agencies including the Florida Department of Environmental Protection. Environmental protection measures will be implemented to ensure that no lasting adverse effects on water quality, air quality, or other environmental resources will occur. Water Quality Certification will be sought from the State prior to construction. The project complies with the intent of this chapter.

18. Chapter 582, Soil and Water Conservation. This chapter establishes policy for the conservation of the state soil and water through the Department of Agriculture. Land use policies will be evaluated in terms of their tendency to cause or contribute to soil erosion or to conserve, develop, and utilize soil and water resources both onsite or in adjoining properties affected by the project. Particular attention will be given to projects on or near agricultural lands.

Response: The proposed project is located on agricultural lands (citrus groves). The project will be consistent with the intent of this chapter.

APPENDIX D – USFWS DRAFT COORDINATION ACT REPORT

APPENDIX A - SECTION 404(B) EVALUATION

SECTION 404(b) EVALUATION

Ten Mile Creek

Water Preserve Area

I. Project Description

a. Location. The proposed Ten Mile Creek Water Preserve Area (WPA) is situated just south of Ten Mile Creek and southwest of Ft. Pierce in St. Lucie County, FL. The planned WPA will be located immediately west of the crossing Florida's Turnpike and Interstate-95 and south of Highway 70 (Okeechobee Road) and north of Midway Road (see figure 1, vicinity map). The low level salinity control structure for Ten Mile Creek is less than one-half mile east of the proposed water preserve area site.

b. General Description

Storm water storage is essential to this action. The proposed action is to construct a two stage detention system. A series of large pumps would be used to deliver waters from Ten Mile Creek into WPA during high water conditions when water is readily available. Estimates of pump capacity are 680 cubic feet per second. Water would be stored in the 554 acre deep water storage cell and then metered out through structures into a polishing cell which is smaller in size (134 acres) and shallower in depth. The deep water storage cell would be kept up to ten feet deep allowing storage of approximately 5000 acre-feet of water. The reservoir will have internal dikes for wave action control and sediment removal. Soil areas (best for dike building) will be excavated by heavy equipment and used for dike construction. The height of the levee around the deep water storage cell will be 12 to 15 feet above surrounding natural ground, whereas the polishing cell levee height would be much less (6.5 feet above grade) (See figure 1&2, vicinity map and project plan view). A 650 ft. overflow weir, consisting of capped sheet pile and riprap will be located within the exterior levee downstream of the pumping station. Water would be delivered from the WPA to the polishing cell through a spillway (500cfs capacity). After the water has been in the polishing area, box culverts will feed an outlet channel back to Ten Mile Creek.

Flows of cleaner water would be delivered back to Ten Mile Creek downstream of the Gordy Road structure, to achieve a more favorable and natural hydrologic regime. Sediment loads will be reduced in these deliveries to the St. Lucie Estuary. The polishing cell would act to further reduce nutrient loads in these deliveries. Stored water can also be released in the drier winter months when low or no flow periods often occur.

c. Authority and Purpose. The proposed Ten Mile Creek Water Preserve Area Critical Project was authorized under section 528 of the Water Resources Development Act of 1996, by Public Law 103-404.

d. General Description of Dredged or Fill Material.

General Characteristics of Material. The material is primarily sand. More detailed information will be determined during detailed design.

(2) **Quantity of Material.** Approximately 1,780,000 cubic yards (cy).

(3) **Source of Material.** The material to create the berm will be excavated from the interior of the WPA.

e. Description of the proposed Discharge Site.

(1) **Location.** The fill will be used to construct the berm walls for the WPA and polishing cell (see figure 2)

(2) **Size.** The WPA site is approximately 554 acres currently in citrus and the polishing cell is 134 acres currently marginal wetlands.

(3) **Type of Site.** The site is citrus and a mixture of wetland communities, pasture, and pine flatwoods.

(4) **Type of Habitat.** The WPA was a citrus grove and the polishing cell was pasture, wetlands, and pine-flatwoods.

(5) **Timing and Duration of Discharge.** The construction starting date and length of time needed to complete the work has yet to be determined.

f. Description of Disposal Method. The mechanical discharge method will be used.

II. Factual Determinations

a. Physical Substrate Determinations.

(1) **Substrate Elevation and Slope.** The height of the levee around the deep water storage cell will be 12 to 15 feet above surrounding natural ground, whereas the polishing cell levee height would be much less (6.5 feet above grade) (See figure 1, vicinity map and figure 2, project plan view). Water would be delivered from the deep water storage cell by a spillway structure to the Polishing cell. Box culverts will be used to release water to Ten Mile Creek.

(2) **Sediment Type.** The excavation material from the citrus grove will be used for the WPA and polishing cell levees. The soil composition has not been determined, but will be during detailed design.

(3) **Dredge/Fill Material Movement.** The fill material will be stabilized and the berm should not be subject to any movement except for minor wind erosion.

(4) Physical Effects on Benthos.**b. Water Circulation, Fluctuation and Salinity Determination.**

(1) Water Column Effects. The water column in the WPA will be temporally filled according to rainfall patterns and the proposed salinity envelop for the St. Lucie Estuary.

(2) Current Patterns and Circulation. Water will be pumped from 10 Mile Creek into the WPA during high flow events. Water will be released from the WPA to the polishing cell and then to 10 Mile Creek when needed during the dry season.

(3) Normal Water Level Fluctuations and Salinity Gradients. Water level fluctuations in the WPA will be rainfall based for the surrounding basin. Water levels in 10 Mile Creek will fluctuate in accordance with the operation of the WPA.

c. Suspended Particulate/Turbidity Determinations.

(1) Expected Changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Disposal Site. The construction will cause a temporary, but insignificant increase in the turbidity and suspended solids in 10 Mile creek.

(2) Effects on the Chemical and Physical Properties of the Water Column.

(a) Light Penetration. Light penetration in 10 Mile creek may be temporally obstructed during construction.

(b) Dissolved Oxygen. If discharges effect 10 Mile Creek, then dissolved oxygen may decrease due to increased biological demand.

(c) Toxic Metals, Organics, and Pathogens. No toxic metals, organics, or pathogens are expected to be released by this project.

(d) Aesthetics. During construction, a temporary disruption of the aesthetics of the area will occur.

(3) Effects on Biota.

(a) Primary Productivity and Photosynthesis. The temporary turbid conditions may effect primary productivity, but no long term effect is expected.

(b) Suspension/Filter Feeders. No significant effect is expected.

(c) Sight Feeders. No significant effect is expected.

d. Contaminant Determinations.

e. Aquatic Ecosystem and Organism Determinations. No significant effect is expected.

(1) Effects on Plankton. Plankton levels in the area will increase due to the construction of the WPA. No significant effect is expected to the Plankton in the polishing cell.

(2) Effects on Benthos. Benthos levels in the area will increase due to the construction of the WPA. No significant effect is expected to the benthos in the polishing cell.

(3) Effects on Nekton. Nekton levels in the area will increase due to the construction of the WPA. No significant effect is expected to the Nekton in the polishing cell.

(4) Effects on the Aquatic Food Web. The polishing cell aquatic food web should not see any significant effects. The WPA will support a deep water food web.

Effects on Special Aquatic Sites.

(a) Hardground and Coral Reef Communities. No significant effect is expected.

Endangered and Threatened Species. Section 7 consultation is under way. A review of the US endangered and threatened species list, published by USFWS, revealed that the following species could frequent or reside in the project area: Wood stork, Arctic Peregrine falcon, Bald eagle, Red-cockaded woodpecker, Florida everglade kite, Eastern indigo snake, and the American alligator. An indigo snake, wood stork, and Catesby lily were observed in the project footprint. The Corps has concluded that the project will have no effect on any of the species.

(7) Other Wildlife. A short term interruption of wildlife will occur during construction. Upon construction completion a change in species from citrus grove inhabitants to water organisms will occur in the WPA. No adverse impacts to wildlife in general is expected.

(8) Actions to Minimize Impacts. All practical safeguards during construction will be taken to preserve and enhance environmental, aesthetic, and economic values in the project area. Standard indigo snake construction protection parameters will be included.

f. Proposed Disposal Site Determinations.

(1) Mixing Zone Determination. The receiving zone is composed of the same material as the construction area, therefore, there will be no mixing zone of dissimilar material.

(2) Determination of Compliance with Applicable Water Quality Standards. No effect on water quality is expected. Coordination with the state of Florida is in progress and the selected plan will be in compliance following the issuance of the state water quality certificate.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supplies. No municipal or private water supplies will be impacted by the project.

(b) Recreational and Commercial Fisheries. During construction no significant effect is expected. Long term fisheries health in the SLE should increase due to this project.

(c) Water Related Recreation. No significant effect is expected.

(d) Aesthetics. No significant effect on human aesthetics is expected.

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. Coordination with the State Historic Preservation Officer is in process and it appears that there are no significant cultural resources to be effected at this site.

(g). Determination of Cumulative Effects on the Aquatic Ecosystem. The cumulative effect of this WPA and the proposed WPA's in the IRL Feasibility Study are to reduce the high flows to the estuary and augment dry season flows to the estuary. The combination of these project features will help restore the SLE to a healthy sustainable estuary.

h. Determination of Secondary Effects on the Aquatic Ecosystem. There are no significant secondary effects expected.

III. Findings of Compliance or Non-compliance with the Restrictions on Discharge.

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. No practicable alternative exists which meets the study objectives that does not involve discharge of fill into waters of the United States.

c. After consideration of disposal site dilution and dispersion, the discharge of fill materials will not cause or contribute to, violations of any applicable State water quality standards for Class III waters. The discharge operation will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

d. The excavation of material will not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973, as amended.

e. The placement of fill material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic species and other wildlife will not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values will not occur.

f. On the basis of the guidelines, the proposed disposal site for the discharge of dredged material is specified as complying with the requirements of these guidelines.

APPENDIX B - PERTINENT CORRESPONDENCE

[Place in this appendix: 1) copies of Notice of Intent and mailing (also in Final EIS, a copy of Notice of Availability of Draft EIS and mailing), 2) copy of mailing list, 3) any other notices and transcripts or minutes of any public meetings, and 3) copy of all correspondence on the EIS.]

APPENDIX C – Threatened and endangered organisms

The following description is of the observed and potential threatened and endangered plants in the 10 Mile Creek WPA and polishing cell footprint. These descriptions were from the report by Carroll (1999).

Observed Endangered

Giant wild pine

A single specimen of the giant wild pine was observed in the swamp forest adjacent to an oxbow of Ten Mile creek and adjacent to the edge of the citrus grove. A specific location was not recorded because swamp habitat is not included in the present footprint of reservoir plans.

Threatened

Catesby lilly

The Southern pine lilly or Catesby's lilly, was observed at three locations in the flatwoods near the pasture in the area proposed as the polishing cell. These

locations were flagged and the GPS latitude and longitude for these locations can be found in Appendix B.

Potential Endangered

Curtis milk weed

Curtis milk weed is found in Indian River and Martin counties. The closest known location is the Savannas State Preserve. It is normally associated with scrub habitat along the Atlantic coastal ridge. In our opinion further consideration is not required.

Four-petal pawpaw

The four petal pawpaw is an endangered species found in Martin county. It is always associated with the Atlantic coastal ridge and the Payola sand soil type is thought to be necessary as being the most common substrate. Therefore, we do not believe this species need be considered further in this analysis.

Many-flowered grass pink

This endangered plant is associated with damp pastures that are fire maintained, and hydric flatwoods. It is known to have occurred in St. Lucie county. It is not expected in the soils we have on this site.

Indian River prickly apple and West coast prickly apple

These cactus species are listed as endangered and are both found in St. Lucie county. They are, however, associated with the Atlantic coastal ridge, not the soils of the central valley. Further consideration is not warranted.

Dildoe cactus

This species is listed as threatened on the state list and has been reported from Martin county. The cactus is most often found associated with the transition zone to high salt marshes and maritime hammocks. Further consideration is not warranted.

Large flowered rosemary

This species is listed as endangered on the state list. It is found in Indian River, Martin and St. Lucie counties in scrub habitat. We examined the scrub habitat thoroughly and no rosemary species were observed. No further consideration is necessary.

Lakel mint

This scrub mint is endangered and is found in limited areas in St. Lucie county. All known sightings have been on Atlantic coastal ridge yellow sand sites, and further consideration is not warranted.

Dingy-flowered epidendrum, Night-scent orchid

These endangered orchids are found in Martin county and counties to the south. They are expected to be at the northern limit of their range in Martin county, and further consideration of these species is not necessary.

Redberry ironwood

This tropical shrub is listed as endangered and is found in Martin county. However, the sites reported are in coastal calcareous soil and this species is thought to be at the northern limit of its range. Further consideration is not needed.

Nodding pinweed

This threatened species is found in scrub of Indian River, Martin and St. Lucie counties. This is a likely species to be found in openings in scrub habitat and should be considered in the environmental assessment.

Simpson stopper

This threatened plant is found in hammocks in all three coastal counties. It is possible that it could be found at this site and it should be considered further.

Fall-flowering pleat-leaf

This endangered plant of flatwoods is found both north and south of the project area. Our botanist spent additional time in the vicinity of the Catesby's lilly sites because of the possibility of observing this species there. The plant is possibly in the project area and deserves consideration although not observed on the site.

Giant sword fern

This threatened species has been reported as occurring in Martin county, however, most of its distribution is subtropical. We would not expect to find it in this inland location, away from moderating coastal influences. Further consideration is not needed.

Hand adder tongue fern

This endangered species is found in Indian River, Martin, and St. Lucie counties. It is associated with cabbage palms. Although not observed, it should be considered further.

Shell mound prickly pear cactus

This threatened species has been found in calcareous soils particularly on shell mounds or former Indian middens. We would not expect it to be found on this particular site.

Pepper (unnamed pepperomia)

This endangered species is reported from Indian River, Martin and St. Lucie counties. It is reportedly associated with upland hardwood and calcareous soil hammocks, usually that are maritime. We recommend that it not be considered further for this project.

Pale-flowered polystacha

This endangered orchid is found in Martin county, however it is at the north end of a more tropical distribution. We need not consider this plant further.

Cretan brake fern

This endangered fern has been located in St. Lucie county, as well as the West Indies, Mexico and Central and South America. It requires calcareous soils, and therefore we would not expect to find it on this site. Further consideration is not necessary for this assessment.

Non-crested coco

This threatened terrestrial orchid is found in many more northern

counties as well as Martin county. It is associated with sand pine scrub, as well as sandhills and rocklands. It remains a possibility for this assessment.

Lace-lip ladies tresses, and Florida Keys ladies tresses

The first of these orchids is threatened and the latter endangered. They have both been reported in Martin county. The Florida Keys ladies tresses is associated with rocklands and calcareous soils and need not be considered further, while the Lace-lip ladies tresses is found in hammock habitats such as are found on this site and should be considered.

Broad Halberd Fern

Although this species has been found in Martin county, it is associated with rockland hammocks, which are not found on this site, therefore it need not be considered further.

Inflated wild pine, Twisted air plant, Soft-leaved wild pine

Since one of the wild pines has been found on the site *Tillandsia utriculata*, the giant wild pine, has been observed on this site these other threatened wild pines or air plants should be considered as a group.

Scentless vanilla

This non-showy endangered orchid has been reported from Martin county. It is usually found in bay heads and we would not expect it to be found on this site because of habitat types present, and further consideration is not needed.

Simpson zephyr lily

This threatened lily is found in Martin and Okeechobee counties in pastures, meadows and wet flatwoods. Although not observed, we recommend it be considered further.

A species was considered if reported as found in the four county area. Information gathered from the Florida Natural Areas Inventory did not indicate the presence of any of the above species in the project area. The endangered and threatened species are following the names assigned in the Official list by the Florida Game and Fresh Water Fish Commission 1997 habitat associations from Coile, Wunderlin and Ward.

The following description is of the observed and potential threatened and endangered animals in the 10 Mile Creek WPA and polishing cell footprint.

Endangered and Threatened and Species of Special Concern

Observed Endangered

Wood stork

A single wood stork was observed in wetlands in pasture adjacent to the pasture within the project area and flying to wetlands contained within the polishing cell area. The nearest known active rookery for wood stork based on 1995 information is located 16.4 miles west of this site. This rookery supported only 8 nests in an agricultural reservoir(Westcott Grove). Rookeries are usually located in Cypress trees in freshwater areas, and mangroves along the coast. This is a low number of observations however the species is listed as endangered on both the state and federal lists and should be considered in the environmental assessment.

Observed Threatened**Eastern indigo snake**

A single indigo snake was observed within the citrus grove during our wildlife survey. This widely distributed species is listed as threatened on both the state and Federal lists. It requires a large home territory and should be considered further during project planning particularly in association with gopher tortoise habitat.

American alligator

A large alligator was observed from canoe at the northwest end of the project within Ten Mile creek. The alligator is listed as a species of special concern on the state list, and is merely listed as threatened because of the similarity in appearance with the American crocodile on the Federal list. This wetland and open water species should be considered further in relation to Ten Mile Creek itself, and the proposed reservoirs.

Sandhill crane

The sandhill crane was observed in two locations during our wildlife survey, one was the Florida Power and Light Company easement adjacent to the flatwoods that are no longer part of the project. This location was pasture like and grazed. The other location was the pasture slated for the polishing cell for this project. This species should definitely be considered further in project planning

Observed Species of Special Concern**Gopher tortoise**

A gopher tortoise was observed in the pine flatwoods which are not part of the current project. By observing burrows and tracks, we learned that gopher tortoises are present on this site and a survey was performed following guidelines for census found in Florida Game and Fresh Water Fish Commission publication "Ecology and Habitat Protection Needs of Gopher Tortoise (*Gopherus polyphemus*) Populations Found On Lands Slated for Large-scale Development in Florida". The survey was performed using transects across suitable habitat in the project area which was determined to be the scrub. Twenty-two active and inactive burrows were also located and marked during the wildlife survey, as well as the transects required for population estimates. The objective was to census 10% of the habitat that is suitable for their use by exploring for burrows 50 feet either side of transect lines. Using a formula, the number of tortoises likely to be on the site can be determined and that number used in coordination with the Florida Game and Freshwater Fish Commission biologists. The calculations for

the total number of 42 gopher tortoises estimated to use this site, are contained in Appendix C.

Wading Birds considered Species of Special Concern.

A number of wading birds observed were seen in small numbers on the site that are listed as species of special concern. Among these are the snowy egret, and white ibis. These species were observed in the wetlands within the pasture or ditches within the citrus grove. White ibis nest nearby in a rookery(along with cattle egrets) in a pond adjacent to the Sunshine State Parkway toll booth, which is about 2 miles away. Our observations indicate the white ibis visiting this site use the landfill across I-95 for foraging.

Potential Endangered Species

Red-cockaded woodpecker

Additionally, the slash pine flatwood(not now part of the project) was examined for its suitability for use by the red-cockaded woodpecker, an endangered species. This woodpecker is listed on both the Federal and State lists, and is confined to small areas of mature slash or long-leaf pine in St. Lucie and Martin counties. The recording of the territorial call of this species was played at random locations and suitable sites were investigated for nesting cavities while making the wildlife survey transects through this habitat type. This yielded negative results. The flatwoods in the polishing cell area were also examined and habitat judged not suitable based on age of pine trees and condition of understory. The red-cockaded woodpecker usually excavates cavities in slash and long leaf pine, that is about 60 years of age or older. Understory plants must leave a clear line of site in the midstory level. Also, no nesting cavities were observed in our inspections using different pathways during the wildlife survey. This species need not be considered further in this analysis.

Snail (everglade) kite

The snail kite is endangered on both the State and Federal lists. It is found in wetland areas where the apple snail, its primary food source, is abundant. It should be considered further in project planning because the snail kite is a nomadic species that is known to use reservoirs that are similar in nature to the proposed polishing cell.

Arctic Peregrine falcon

This migrating endangered species should be given minimal consideration because of its ability to forage both in open pasture, marshland, and reservoir edges.

Florida panther

The Florida panther is an endangered species on both the State and Federal lists. It maintains a viable population in the Southwest Florida area. Its primary food source is the white tailed deer. While an occasional young male animal may stray into this area, this species should not receive special attention in this analysis.

West Indian manatee

The West Indian manatee is found in the Indian River Lagoon, the St. Lucie River, and could be expected to come up Ten Mile Creek to the Gordy Road Structure. It is doubtful that manatees have access above this radial gate structure, but because they have been known to be crushed in water control structures, they should be considered in design of outfall structures for the polishing cell.

Potential Threatened Species

Florida scrub-jay

The Florida scrub-jay is listed as threatened on both the State and Federal lists. While performing the wildlife survey in the scrub, the territorial scolding call of the threatened Florida scrub-jay was played at scattered locations. There was no scrub jay response to the tape playing. This species was not observed in our survey, and need not be considered further for this project.

Audubon crested caracara

The range of the threatened Audubon's crested caracara includes St. Lucie County. The main areas where this bird would be likely to be encountered are west of the project area in the vast ranches and pastures of western St. Lucie County. Caracara would utilize pasture and marshes for foraging, and further consideration based on an occasional visitor does not seem warranted for this analysis.

Southern bald eagle

The southern bald eagle is found near open waters of the state of Florida. This threatened species requires tall pine trees for nesting in the winter months, and takes advantage of open water for fish and birds as prey species. This large reservoir complex could be attractive to this species and it should be considered further.

Potential Species of Special Concern

Gopher frog

Gopher frogs are present when the proper conditions are provided, and the species' range includes St. Lucie County. These conditions can be satisfied when there are abundant gopher tortoise burrows near a wetland area. The burrows we found were in a scrub area that was distant from wetland areas. Therefore, we believe this species need not be considered beyond the requirements and processes required associated with the gopher tortoise.

Florida pine snake

The Florida pine snake is associated with xeric sites, and is also associated with gopher tortoise burrows. Although not observed in the wildlife survey, it should be considered in conjunction with the gopher tortoise habitat in the scrub.

Little blue heron, tricolor heron, roseate spoonbill, limpkin, reddish egret

The roseate spoonbill is most often associated with brackish water habitats. These other wading birds have potential to be found in the reservoir area and should be considered further in project planning.

Florida mouse

This species is associated with coastal scrub, and scrubby flatwoods. The range includes eastern St. Lucie County. It should be considered in regard to the scrub habitat identified on this site.

Florida black bear

The Florida black bear is listed as threatened on the state of Florida list and has recently been dropped as a candidate species by the Fish and Wildlife Service. There is no concentration of bears in this county and any use of this property would be incidental. This species need not be considered further in the analysis.

Sherman's fox squirrel

The information from the Florida Natural Areas Inventory and the Florida Game and Freshwater Fish Commission indicated that fox squirrel sightings had been made east of the project area. Also the grove manager, indicated that fox squirrels are seen often in the citrus grove especially when the fruit is ripe. Although we did not observe this species it should be considered in the environmental assessment.

The Florida Natural Inventory Map is included in Appendix C. In addition a listing letter from the Fish and Wildlife Service and Florida Game and Freshwater Fish Commission will be sought. The gopher tortoise transects for population estimates will allow initial conversations with the Commission about the need for final surveys before construction.

Potential environmental effects in Endangered and Threatened Vegetation**Observed species****Catesby lilly**

The Southern pine lilly or Catesby's lilly, a threatened plant species was observed at three locations in the flatwoods near the pasture in the area proposed as the polishing cell. These locations were flagged and the GPS latitude and longitude for these locations can be found in Appendix A so that transplantation can be considered during detailed planning. If these plants are not transplanted or the immature flatwoods excluded from the reservoir, these lilies will be eliminated.

Giant wild pine

A single specimen of the Giant wild pine was observed in the swamp forest adjacent to an oxbow of Ten Mile Creek and adjacent to the edge of the citrus grove. The present design provides for the dike to be constructed outside the swamp and hydric hammock along the edge of the citrus grove, therefore, there should be no impact on this species.

Potential**Nodding pinweed**

This threatened species is found in openings in scrub habitat. If the scrub habitat is included in the reservoir area, and if this plant is present, it would be eliminated.

Simpson stopper, Lace leaf ladies tresses

These threatened plants are found in hammocks and it is possible that one or both could be found at this site. Since hammocks and swamps are to be preserved under the current plan, these species, if present, should remain.

Fall-flowering pleat-leaf

This endangered plant of flatwoods is found possibly in the flatwoods portion of the project area and although not observed on the site during this early survey stage, if present it would be eliminated unless detailed surveys are made, and if found, it is transplanted.

Hand adders tongue fern

This endangered species is found associated with cabbage palms. Although not observed, the preservation of the swamp and hydric hammock should maintain any members of this species intact.

Non-crested coco

This threatened terrestrial orchid is found associated with sand pine scrub, as well as sandhills and rocklands. It remains a possibility in this assessment, although not observed. The scrub habitat should be inspected for this species before flooding takes place, and transplantation considered if found.

Inflated wild pine, Twisted air plant, Soft-leaved wild pine

The preservation of the hydric hammock and the swamps adjacent to Ten Mile Creek and the oxbows should keep any examples of these threatened wild pines or air plants species.

Simpson's zephyr lilly

This threatened lilly is found in pastures, meadows and wet flatwoods. Although not observed, if present it would be eliminated unless found and transplanted.

Impacts on Endangered and Threatened Species

Observed Endangered

Wood stork

A single wood stork was observed in pasture wetlands adjacent to the pasture within the project area and also flying to wetlands contained within the polishing cell area. This is a low number of observations of this endangered species. The project should neither benefit nor hurt the wood stork. They are capable of feeding in shallow water without a drying situation and food concentration. This is accomplished by using their pink colored feet and closing on forage fish that expect their feet to be food. Thus, there will be occasionally good feeding in the shallow reservoir and ditches that will replace feeding in project wetlands.

Observed Threatened

Eastern indigo snake

A single indigo snake was observed within the citrus grove during our wildlife survey. This threatened species can take advantage of several habitats but not reservoirs, therefore, there will be a net loss of several individual's home ranges. If set aside, the scrub habitat on this site would appear to be the best suited for

this and other species associated with gopher tortoise burrows. Care should be taken during construction to avoid direct impacts to this species.

American alligator

Alligators were observed in the Creek and in ditches within the citrus grove. They will be attracted to forage in both reservoirs and increases in this species will occur. Cleaner water with less pesticides will also benefit this species downstream.

Sandhill crane

The threatened sandhill crane was observed in two pasture locations during our wildlife survey. Sandhill cranes nest in wetlands with a small permanent water area. This condition exists now, but will not after this project is constructed. There will be a net loss of habitat in the project area, however, the adjacent Florida Power and Light Company easement will continue to provide some habitat for this species.

Observed Species of Special Concern

Gopher tortoise

By observing burrows and tracks, we learned that Gopher tortoises are present on this site and a survey was performed following guidelines for census found in Florida Game and Fresh Water Fish Commission publication "Ecology and Habitat Protection Needs of Gopher Tortoise (*Gopherus polyphemus*) Populations Found On Lands Slated for Large-scale Development in Florida". Twenty two Active and Inactive burrows were also located and marked during the wildlife survey and the transects required for estimates. We used a formula to calculate the number of tortoises likely to be on the site.

The calculations for the total number of 42 gopher tortoises estimated to use this site are contained in Appendix A. This amounts to a density of approximately two tortoises per acre of scrub habitat north of the borrow pit lake. Coordination with the Florida Game and Freshwater Fish Commission Biologists will be based on this estimate. Transportation to another site and avoidance of this habitat should be considered, since all habitat for this species will be lost after project completion.

Wading Birds considered Species of Special Concern

A number of wading birds observed were seen in small numbers on the site that are listed as species of special concern. Among these are the snowy egret, and white ibis. Our observations indicate the white ibis visiting this site use the landfill across I-95 for foraging, and may continue to use the reservoir edges for

freshwater and washing after that activity. Otherwise the white ibis will be restricted to using mats of floating vegetation, where they have the capability to forage between and on the floating plants. They probe with their decurved bills and find insect larvae, shrimp, amphipods, crayfish, and small fish there. White ibis being an opportunistic feeder will still find foraging sites within the reservoirs, but will use this site on a diminished basis.

Snowy egrets will not find suitable foraging habitat after reservoir filling except along the edges because of their short legs.

Snail (everglade) kite

The snail kite is endangered on both the state and Federal lists. It is found in wetland area where the apple snail, its primary food source are abundant. The Snail kite is a nomadic species that is known to use citrus irrigation reservoirs, that are similar in nature to the proposed polishing cell. We expect the kite to use the polishing cell either for periodic use when apple snail populations are high, or as a refugia during dry conditions in their main home range area. Kites prefer areas with restricted drying rates which should be found in the polishing cell. They usually nest in woody vegetation surrounded by water but can nest in cattail vegetation. There should be a net benefit for this species from this project, and nesting could occur in the polishing cell on a periodic basis.

Arctic Peregrine falcon

This migrating endangered species should be given minimal consideration because of its ability to forage both in open pasture and marshland and reservoir edges. We expect no impact on this species.

West Indian manatee

The West Indian manatee is found in the Indian River Lagoon, the St. Lucie River, and could be expected to come up Ten Mile Creek to the Gordy Road Structure. It is doubtful that manatees have access above this radial gate structure, but design of outfall structures for the polishing cell should be made so that mortality is not expected.

Southern bald eagle

The southern bald eagle is found near open waters. It is an opportunistic feeder, feeding primarily on fish, water birds, and turtles. This threatened species is riparian in nature, requires tall pine trees for nesting in the winter months, and takes advantage of open water for fish and birds as prey. This large reservoir complex with adjacent pine forest should be attractive to this species, therefore, this project will be beneficial to this threatened species.

Potential Species of Special Concern**Florida pine snake**

The Florida pine snake is associated with xeric habitats and sites, and is also associated with gopher tortoise burrows. Although not observed in the wildlife survey, we could assume their presence in conjunction with the gopher tortoise habitat in the scrub on this site. Habitat for this species will be eliminated if scrub habitat is included in the reservoir.

Little blue heron, tricolor heron, limpkin, reddish egret

These wading birds have potential to be found in the reservoir area, particularly the northeast corner of the marshy polishing cell, and along the edges of the deep water storage cell. These areas will favor more long legged waders and populations of these species will not be enhanced, and will most likely be diminished by the losses of seasonally flooded wetland areas and ditches from the site.

Florida Mouse

This species is associated with coastal scrub, and scrubby flatwoods. Unless this habitat is preserved, then if present, they will be eliminated from the project area.

Sherman's Fox squirrel

Information from the grove manager, Florida Natural Areas Inventory and the Florida Game and Freshwater Fish Commission indicated that Fox squirrel sightings had been made in or near the project area. Although we did not observe this species, they are undoubtedly using the grove area on a seasonal basis. It is difficult to assess the impact of removal of a seasonal food source provided by the grove, however the project will not benefit this species.

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